Message

**From:** Maureen Johnson [mjsciled@earthlink.net]
**Sent:** 1/6/2022 11:08:19 PM
**To:** Nichols, Miranda (MPCA) [miranda.nichols@state.mn.us]
**Subject:** Comment on Draft 2022 Impaired Waters List
**Attachments:** SpringMineCreek MPCAdataSurfacewaterpage 010622.xlsx; JohnsonMNConductivityEvaluationRpt(Nov. 2015).pdf; EPACormierReviewJJrpt020416.pdf; 12-28-11MPCA CliffsTailingsBasinletter copy.pdf
**Importance:** High



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We appreciate the opportunity to comment on the impaired waters 2022 delisting. We are retired biologists, both having worked for MPCA, USEPA, and other federal and state departments.

We looked at one example, and find we have so many questions about this site that we ask MPCA to apply these questions in general terms to all of the sites proposed for delisting, since the process is the same. We are concerned that delisting of impaired waters like Spring Mine Creek may be proposed with inadequate and inappropriate data evaluation based on specific questions, presented below.

**Background**

Watersheds compromise numerous stream drainages liken to a trees branches that combine to larger branches and finally a trunk. The effect is similar to how limnologists have described lake water quality as a reflection of its watershed. The more contamination in the watershed the poorer the lakes water quality. Prior to 1976 it was well known that sub watershed streams played a critical role in overall watershed water quality. Recognizing this, the regional copper nickel study characterized all sub-watersheds stream reaches as to their physical characteristics within the study area, which included the Upper St Louis River (Johnson). Thus, protecting small tributary branches is critically important in the protection of entire watershed.

MPCA Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment, 2022, states a water is defined as impaired when the water is not fully supporting its beneficial

uses, which are aquatic life and recreation for Class 2B waters. We conclude if a beneficial use is reduced, the water quality is indicated by violation of numeric standards, or violation of narrative standards about toxicity or both. Toxic is defined in MINN Stat. 115.01 as: Subd. 20.

*"Toxic pollutants" means those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to the agency, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, including malfunctions in reproduction, or physical deformation, in such organisms or their offspring.*

To further comply with the statute MPCA narratively defines toxic as it relates to aquatic life beneficial use.

7050.0217 OBJECTIVES FOR PROTECTION OF SURFACE WATERS FROM TOXIC POLLUTANTS.

*Subpart 1.* ***Purpose and applicability.*** *The purpose of this part is to establish the objectives for developing numeric water quality standards listed in parts 7050.0220, 7050.0222, 7050.0227, and 7052.0100 and site-specific water quality criteria for toxic pollutants or chemicals developed in the absence of numeric standards. The listed numeric standards for toxics and site-specific numeric criteria established by methods in parts 7050.0218 and 7050.0219 protect class 2 waters for the propagation and maintenance of aquatic biota, the consumption of fish and edible aquatic life by humans, the use of surface waters for public and private domestic consumption where applicable, and the consumption of aquatic organisms by wildlife. These criteria also protect the uses assigned to class 7, limited resource value, waters as described in parts 7050.0140 and 7050.0227.*

*Subp. 2.* ***Objectives.***

*A. Protection of the aquatic community from the toxic effects of pollutants means the protection of no less than 95 percent of all the species in any aquatic community. Greater protection may be applied to a community if economically, recreationally, or ecologically important species are very sensitive.*

*B. Protection of human consumers of fish, other edible aquatic organisms, and water for drinking from surface waters means that exposure from noncarcinogenic chemicals, including nonlinear carcinogens (NLC), singly or in mixtures, must be below levels expected to produce known adverse effects; the combined risk from mixtures of noncarcinogens and NLC must not exceed the common health risk index endpoints or health endpoints described in part 7050.0222, subpart 7, item D; and the incremental cancer risk from exposure to carcinogenic chemicals, singly or in mixtures, must not exceed one in 100,000. The combined risk from mixtures of linear carcinogens (C) will be determined as described in part 7050.0222, subpart 7, item E.*

*C. Protectionofwildlifethateataquaticorganismsmeanstheprotectionofthemostsensitive wildlife species or populations. Greater protection may be applied if the exposed animals include endangered or threatened wildlife species listed in chapter 6134, or in Code of Federal Regulations, title 50, part 17, under the Endangered Species Act of 1973, United States Code, title 16, sections 1531 to 1543.*

## Guidance to Resolve 303d Impairments:

Once a water is placed on the 303D list of impaired waters, EPA guidance requires the following actions (with excerpts from the guidance) be taken to resolve the impairment (https://www.epa.gov/tmdl/impaired-waters-restoration-process-improvements):

**1. Planning**

*Water restoration planning involves developing and completing TMDLs, or in some cases alternative restoration approaches, for the waters identified and listed as impaired. A TMDL* [total mass daily load] *is essentially a plan, usually based on monitoring information and scientific modeling that describes how pollutant loads coming from various types of sources must be reduced in order to meet water quality standards.*

**2. Implementing**

*Implementing a TMDL for an impaired water body involves applying the pollution control* practices *necessary to reduce the pollutant loads to the extent determined necessary in the TMDL. These practices usually consist of point source control permits and/or non-point source control Best Management Practices (BMPs).*

**3. Improving**

*Where monitoring data are available, changes can be documented and reported. Partial, but significant, changes may occur, but remain short of full water quality standard attainment. For example, incremental improvement may occur when a water body with multiple pollutants is no longer impaired by one or more of its former problems. Also, monitoring aquatic measures of condition may show significant improvement in a specific chemical or physical parameter, or an improved biological community measure.*

*The TMDL program analysis focused on approaches for detecting improving conditions and identifying driving factors that are associated with improvements. A waterbody remains on the 303(d) list until it is fully recovered and meets water quality standards.*

**4. Recovery**

*Recovery of the water body culminates after the gradual improvement as control practices take effect. Generally, this occurs many years after the TMDL was developed and put into place. Although a significant number of years may have elapsed, a properly calculated TMDL and feasible, well-implemented controls from years earlier are eventually crucial to full recovery of the impaired water body.*

In 2016 MPCA developed its own guidance for TMDL evaluation: *Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report and 303(d) List.* This manual is required to at least meet the intentions of the EPA guidance and we have not evaluated it.

IBIs can be used to assist in determination of general water biological welfare. MPCA has developed protocols for IBIs. Invertebrate protocols are found in: *MPCA (2014) Development of a macroinvertebrate-based Index of Biological Integrity for assessment of Minnesota's rivers and Streams. Minnesota Pollution Control Agency, Environmental Analysis and Outcomes Division, St. Paul, MN.* IBIs are used to assist in determining water overall biological health. As MPCA states below:

*...Waterbody monitoring and condition assessment provide resource managers with information needed to guide restoration and protection efforts. A wide variety of indicators are used in water monitoring and assessment programs, but among the most useful are those that integrate and reflect cumulative impacts to aquatic systems. The degradation of surface waters can be attributed to multiple sources including: chemical pollutants from municipal and industrial point source discharges; agricultural runoff of sediment, nutrients, and pesticides; hydrologic alteration in the form of ditching, drainage, dams, and diversions; and habitat alteration associated with agricultural, urban, and residential development. The timing and magnitude of these impacts may vary through time, and be difficult to detect and measure utilizing traditional chemical evaluations that focus on a single indicator or small suite of parameters....* Thus, once impairment is found chemically or biologically or both, IBIs are one tool to assist to monitor recovery success. IBIs are not direct toxicological evaluations of potential contaminants. The protocol states further: *Bracketing each IBI assessment threshold is a 90 percent confidence interval that is based on the variability of IBI scores obtained at sites sampled multiple times in the same year (i.e., replicates). Confidence intervals account for variability due to natural temporal changes in the community as well as method error. For assessment purposes, sites with IBI scores within the 90 percent confidence interval are considered "potentially impaired." Upon further review of* available supporting information, an IBI parameter review may change to "indicating support" or," indicating severe impairment" depending on the extent and nature of this additional information (Figure 2).

The USEPA has also developed methods for toxicity reduction evaluations in the following document: *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (TREs) EPA/600/2-88/070 April 1989.* It provides: *A six-tier approach was directed toward the reduction of toxicity of the whole effluent rather than specific components within the effluent. A flow chart was designed as a dichotomous key linking the phases in a systematic progression to achieve the final result, which is an effluent that consistently meets the toxicity limitation assigned to it. The six tiers include: 1) information and data acquisition; 2) an evaluation of remedial actions to optimize the operation so as to reduce final effluent toxicity; 3) characterization/identification of the cause(s) of the final effluent toxicity; 4) identification of the source(s) of the toxicity in the facility; 5) identification and evaluation of methods for reducing toxicity in the final effluent; and 6) follow-up of the toxicity reduction to confirm that the toxicity limitation is met and maintained...*

One TRE USEPA has approved is MPCA's Shingle Creek Chloride TMDL Report (Wenck, 2006), which appears to have followed the above guidelines.

**Spring Mine Creek as an example of the 2022 delisting process**

Spring Mine Creek (Creek) is documented to exist as early as 1938 (Johnson 2015).

The original Spring Mine Creek originates from high on Giants Ridge. A mine pit later intersected the Creek and contributes to the Creek's condition. *Spring Mine Creek headwaters in Section 2 (Figures 5a and 5b) are affected by mine pits and, possibly, by the LTV tailing basin. Buried stream beds continue to conduct water and act as underground conduits after burial. Some drainage from the tailing basin appears to follow a "former channel" into a pit named Spring Mine Lake. 96 (Barr, 2014). The pit/lake then discharges into Spring Mine Creek to the Embarrass River. Area mine pits and LTV tailing seepages contain elevated specific conductance, bicarbonates, hardness, and sulfates.* (Johnson 2015, p. 38).

A mining permit discharge also affects the Creek.

MPCA determination of the impairment discussed in their 2016 St. Louis River Watershed Stressor Identification Report (page 291):

*...Spring Mine Creek is the only stream in this watershed zone that is listed as impaired for macroinvertebrate bio assessments. The M-IBI results from this stream were narrowly below the impairment criteria and do not suggest severe impairment. However, ancillary information considered in the assessment process (elevated specific conductivity readings; invertebrate samples dominated by Gammarus and Corixidae) resulted in an impairment listing. Symptoms of impairment observed in Spring Mine Creek include a very low relative percentage of non-Hydropsychid caddisfly taxa (1.6%) and imbalance in the distribution of taxa present. Over 76% of the individuals counted were from the five most abundant taxa in the sample. Bear Creek, which has been discussed as a potential reference stream for this watershed zone, shows more balance among taxa present, supports more intolerant taxa, and better representation from the order Trichoptera (Table 61)...,... Available water quality, biological, physical habitat, and land-use data were reviewed to develop a list of candidate causes for the fish and macroinvertebrate impairments in Spring Mine Creek. The following candidate causes for impairment will be evaluated in this section:*

1. *Low DO / High DO Flux*
2. *High Specific conductivity*
3. *Sulfate Toxicity.*

The following summarizes the MPCA data presented for delisting (https://webapp.pca.state.mn.us/surface-water/station/09LS101), https://webapp.pca.state.mn.us/surface-water/station/15LS058,

which prompted the following questions regarding the delisting determination:

**IBI Data Reported:**

5 fish IBIs from 2009 – 2019

2 invertebrate IBIs, 2009, 2019

**Questions:**

- What is the statistical significance of five and two samples in 10 years?

- How does this number of IBI samples conform with the above MPCA protocol for 90% confidence limits?

- How does the IBI fully comply with both Minn. Stat. 115.01 Subd. 20, and Minn. Rule Ch. 7050.0217 for toxicity evaluation and determination of long-term successful improvement to delist?

-If MPCA only uses IBIs (which to us is inappropriate), why did MPCA go to the trouble of all the reports and work that culminated in the St. Louis River Stressor Report.

**Chemical Data Reported:** Five samples represent the water conditions from 2009 through 2019. The parameters reported are as follows: temperature, conductivity, turbidity, dissolved oxygen, pH, total nitrogen, total phosphorous, total suspended solids, ammonia.

**Questions:**

- What is the statistical significance of five samples in 10 years?

- How were high concentrations at low flow (dry or winter conditions) and dilution of contaminants at high flow (spring melt, heavy rain storms) into consideration in the sampling plan for the sampling dates (6/19, 6/23, 6/25, 8/9, 9/16)?

- The St Louis River stressor report expressed concerns over toxicity from high specific conductance and sulfate as well low dissolved oxygen and high dissolved oxygen flux.

There is no mention of the toxicity of the contaminants in the Creek being remedied, only that "WQS standards attained." We understand that many WQS in the list have been eliminated in the MPCA rules. But WQS also include criteria and narrative standards. Doesn't the narrative standard for toxicity above apply when you define biological impacts indicated by the generalized IBIs? For impacts of specific conductance, not including the toxicities of the chemicals that result in specific conductance, the US EPA calculated a benchmark for the NE MN Ecoregion 50 as 320 (Cormier 2016) and supports our report on a smaller portion of Ecoregion 50 (Johnson, 2015). If water body in Ecoregion 50 fails this number, likely it does not meet the rule requiring 95% survival of species.

- The MPCA's letter to LTV steel dated 12/28/2011 p. 8 (attachment), discussed MPCA toxicity concerns from the release of sulfate, bicarbonate, total hardness, specific conductance from the taconite tailing basin seep SD033 up gradient of Spring Mine Creek. What is the rationale for excluding these parameters' toxicities from MPCA's sampling for Spring Mine Creek?

- Regarding the MPCA's letter to LTV steel dated 12/28/2011, page 7, (attachment):

Given that wild rice is present downstream of the Creek and sulfate has been determined to extirpate wild rice why was sulfate not analyzed?

- Since mercury is documented released by low levels of sulfate from wetlands, and mercury is a major problem in fish bioaccumulation as documented by the Minnesota Department of Health's fish consumption advisories, why was mercury not sampled?

-why are comments not in the flow data column? Spring snow melt or heavy rain storm periods can dilute pollutants, and dry times can concentrate them. Flow or at least flow conditions is important.

**Aquatic life Data Reported:**

List of fish (common names) 5 samples 2009-2019;

Invertebrate groups (unlisted by genus or species) 2 samples 2019, 2009;

**Question:**

- What is the statistical significance of 5 samples and 2 samples in 10 years?

**Species attributes Data Reported:**

Examples of fish attributes are abnormalities, pollution intolerance per 100 meters: 5 samples 2009-2019;

Invertebrates: examples are intolerant families, total families, 2 samples 2009-2019;

**Questions:**

- What is the statistical significance of two samples in 10 years?

- How does the use of biological Family structure produce necessary sensitivity to determine if sensitive species are almost extirpated or recovered? (MN Rules CH 7050, Cormier 2016)?

- Were the two samples that were acquired taken at the appropriate season to find if sensitive species have been extirpated? (Cormier, 2016)

- We note that the pollution intolerant species numbers and the total species numbers of fish are exactly the same for 2009 and 2019 how does this support delisting?

The ACTT review team recommended for the WAT requestors' Impairment Categorization Request for Spring Mine Creek on 6/14/21:

*Recommend a delisting to the impaired waters list for fish bioassessments and benthic macroinvertebrates bioassessments. Applicable WQS attained; due to restoration activities. Recent data exhibits improved water quality; water body is considered restored for the parameters in question and there is documentation of actions taken to improve water quality – namely, the road crossing improvement as the effects of the bioreactor projects are still unknown.*

The above recommendation does not include a list of the WQS attained and "parameters in question" are not identified. We understand the many Classes 3 and 4 numerical standards have been removed, but that does not

mean the Stressor report's identified stressors are not "toxic" according to the MPCA rules above; they merely have not yet had appropriate criteria promulgated into Class 2 rules yet as MPCA has proposed to do. The data we've reviewed (attached) is not sufficient to meet the regulatory and scientific requirements, some of which are described in the first section of this document.

If a bioreactor is a potential major reason for the improvements, will it be operated indefinitely? What will happen to the Creek if it is not operated? If the Creek depends on this, it should not be delisted as it has not permanently recovered.

Where is the data for the point source reduction that is checked in this document ? delisting of impaired waters like Spring Mine Creek may be proposed with inadequate and inappropriate data evaluation based on specific questions, presented below.

If wild rice has ever been found in Spring Mine Creek, as it has been found in some headwaters of Embarrass River, Spring Mine Creek should be considered to be listed as a wild rice water, as should any other Embarrass River headwater with observed wild rice. (LTV Consent Decree field reports referenced in attachment). In this case, the wild rice sulfate standard applies.

**Summary statement**

We have observed that delisting of Spring Mine Creek is proposed with inadequate and inappropriate data evaluation based on specific questions and discussions presented above. We request that all waters proposed for delisting based on "WQS attainment" and IBI work but lacking toxicity considerations be postponed for delisting until toxicity of pollutants and other issues are sufficiently addressed.

**References:**

Cormier 2016, "An Evaluation of a Field-Based Aquatic Benchmark for Specific Conductance in Northeast Minnesota" (November 2015). Prepared by B. L. Johnson and M. K. Johnson for Water Legacy. Susan M. Cormier, Ph.D. National Center for Environmental Assessment—Cincinnati, Office of Research and Development, U.S. EPA, February 4, 2016

Johnson 2015, *An Evaluation of a Field-Based Aquatic Life Benchmark for Specific Conductance in Northeast Minnesota,* Johnson Bruce L., Johnson Maureen K., p.33

(November 2015)

Johnson, no date, Regional Copper Nickel Study Stream Order Classification, Johnson Mark D., Bjorgum Greg, #17, http://www.leg.state.mn.us/lrl/lrl.asp

Wenck 2006, Shingle Creel TMDL Report, Wenck and Associates, Prepared for Shingle Creek Water Management Association, and Minnesota Pollution Control Agency, December 2006.

Attachment

Spreadsheet, Summary of data on MPCA's surface water webpages for Spring Mine Creek